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The Convergence Paradox: Technology Adoption and Competitive Dynamics Across Public Sector, Private Sector, and Fintech Banking in India

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ABSTRACT

Technology has become the topmost agenda in the Indian banking sector for the last decade or so. The Unified Payments Interface launched in April 2016, and large public sector banks like State Bank of India developed technology-enabled banking platforms like YONO to reach customers. Similarly, large private sector banks like HDFC Bank migrated to AI and machine learning-enabled interfaces and offerings. The most surprising and interesting development has been the emergence of a large, ambitious, and rapidly growing financial technology (fintech) sector. Many of these fintech companies have grown to become large conglomerates in a short span of time. One such company is Paytm, which has grown from a small company accepting payments through mobile wallet to a company offering payments bank services to forty-five crore users. The Unified Payments Interface has grown exponentially and in calendar 2025, the interface averaged out twenty-one and a half billion monthly transactions worth thirty lakh crore rupees, the highest in the world, on a real-time basis. This paper attempts to examine the technology-driven changes in the businesses and operations of the banks. A comparative analysis of State Bank of India, HDFC Bank and Paytm Payments Bank / One97 Communications has been done to understand the way technology has impacted the banking businesses. Secondary sources like annual reports of the three banks, official data from the Reserve Bank of India, industry reports, and business journalism post 2026 have been used to study and analyse the subject. Observations reveal that public banks, private banks, and fintech banks are moving towards similar business models, driven by the increased importance of mobile-based interfaces, AI and machine learning, and the Unified Payments Interface. Each of the banks under study has also got unique strengths emanating from their history, customer base, and governing structures. The banks in India are currently experiencing convergence as well as divergence in their development a phenomenon relevant from the point of view of strategies, policies, regulations, and competition in the banking sector.

Keywords: Banking Technology, Digital Transformation, UPI, FinTech, Indian Banking Sector

INTRODUCTION AND LITERATURE REVIEW

Introduction

Indian banking functions as the core financial system supporting over five hundred million bank accounts through its role of managing the expanding national savings and investment distribution. The sector experienced a complete transformation during the last ten years because technology advanced at an unprecedented speed. This transformed banking operations and banking processes. Modern banking depends on technology as its core operational system which enables customer banking interactions, transaction processing and evaluation, and regulatory monitoring of financial institutions.

The Indian banking industry is characterised by a distinctive structural diversity that shapes how different institutions have responded to this technological transformation. At the core of the industry sit the public sector banks, majority-owned by the Government of India and operating under a combination of commercial logic and public policy mandate, of which the State Bank of India is the largest. Alongside them operate the private sector

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banks, including HDFC Bank, ICICI Bank, and Axis Bank, which compete vigorously on technology-led product innovation and disciplined cost management. The third category consists of financial technology institutions, including payments banks such as Paytm Payments Bank and the broader One97 Communications platform, which typically operate without extensive branch networks and serve customer relationships almost entirely through digital channels. This paper examines how technology has affected business and financial operations across all three categories through a comparative analysis of one representative institution from each.

LITERATURE REVIEW

The academic literature on technology adoption in banking rests on several foundational frameworks. The Technology Acceptance Model which Davis (1989) developed shows that users decide to adopt technology based on their ability to perform tasks and their ability to operate systems efficiently. The Unified Theory of Acceptance and Use of Technology emerged from Venkatesh, Morris, Davis, and Davis (2003) who combined eight previous models to create four main factors which influence people to use technology: performance expectancy, effort expectancy, social influence, and facilitating conditions. The Diffusion of Innovations model by Rogers (2003) explains how new ideas spread among people through different stages. These include innovators, early adopters, early majority, late majority, and laggards.

Researchers have implemented these theoretical frameworks to study banking operations throughout India. Mohanty and Tripathy (2025) conducted a systematic review of sixty-four studies which applied TAM and UTAUT to banking between 2003 and 2024. Singh and Maiti (2024) conducted their research on Indian banking through digitalisation by using a UTAUT-based model, showing performance expectancy and effort expectancy as the most influential factors for adoption. The research by Sharma and Choudhury (2024) focused on digital payment adoption among Generation Y and Generation Z users while determining that financial literacy functions as a major influencing factor. The Technology Acceptance Model received an expansion from Garg and Rani (2025) who added bank performance indicators for environmental, social, and governance aspects which proved to be major factors for online banking usage after the pandemic.

The institution-specific literature documents the distinctive technology journeys of the major Indian banks. Sharma (2021) examined the development of the State Bank of India's YONO platform from its conceptualisation as Project Lotus through its launch in November 2017. Klover AI (2025) provided a detailed analysis of HDFC Bank's artificial intelligence strategy, characterising the bank as pursuing a phygital model that integrates branch presence with digital channels. Medianama (2025) and Inc42 (2026) examined the Paytm Payments Bank case following the Reserve Bank of India's January 2024 restrictions, interpreting the company's subsequent strategic pivot toward a Third-Party Application Provider and payment aggregator model as a textbook example of crisis-driven reinvention.

Regulatory and institutional sources document the broader environment within which these institutions operate. The Reserve Bank of India (2025) published the Framework for Responsible and Ethical Enablement of Artificial Intelligence, setting out principles for artificial intelligence deployment in Indian financial services. SBI Research (2025) released detailed analysis of Unified Payments Interface data, establishing that the State Bank of India is the top remitter bank with approximately five point two billion transactions per month. The Atlantic Council (2025) identified India's Digital Rupee as the second-largest central bank digital currency pilot in the world by scale.

Research Gap, Questions, And Objectives

Research Gap

Four particular gaps continue to exist in the expanding research about banking technology in India. The current body of research concentrates on deep analysis of individual banking institutions and customer adoption behaviour, yet lacks studies which compare the three main Indian banking sectors through a single analytical framework. The 2024 to early 2026 period has seen multiple developments, which include Reserve Bank of India restrictions on Paytm Payments Bank, the August 2025 FREE-AI framework, and the December 2025 YONO 2.0 launch and financial technology regulatory progress. These events remain unconnected in existing

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analyses. The TAM and UTAUT research field which focuses on customer behaviour has failed to establish an institutional perspective which investigates how different banking institutions adopt and implement new technologies at various speeds. The combination of artificial intelligence with the Digital Rupee and Indian Digital Public Infrastructure has not been studied in a systematic way to understand how these elements affect competition within the sector beyond their individual effects.

Research Questions

1. How does the adoption and utilisation of digital banking technologies differ across public sector banks, private sector banks, and financial technology institutions in India?

2. What relationship exists between technology adoption and operational efficiency, customer reach, and competitive positioning in the three selected institutions?

3. What are the key similarities and differences in the technology trajectories of the State Bank of India, HDFC Bank, and Paytm Payments Bank, and what do these reveal about the broader competitive dynamics of Indian banking?

Research Objectives

1. To examine the impact of technology on the operations and business models of public sector banks, private sector banks, and financial technology institutions, using the State Bank of India, HDFC Bank, and Paytm Payments Bank as representative cases.

2. To analyse the role of technology in improving financial services including digital payments, online banking, and mobile banking across the three selected institutions, and to evaluate the benefits of technology adoption in terms of operational efficiency, customer reach, and service innovation.

3. To identify the key challenges and risks faced by banks and financial technology institutions in the process of technology implementation, and to examine the influence of technology on decision-making, customer experience, and competitive positioning in the Indian banking sector.

RESEARCH METHODOLOGY

Research Design

The research study implements a qualitative approach through its descriptive and analytical research framework. The descriptive component documents the current state of technology adoption and business performance at each of the three institutions in the sample. The analytical element performs a three-institution assessment by examining multiple aspects of technology adoption and business performance to discover commonalities and distinctions. The study employs an interpretive method, using multiple secondary sources to build a strong evidence-based comparison instead of testing a statistical hypothesis in the traditional manner.

Data Collection

All research in this study depends on secondary data, consisting of information previously gathered and published by other researchers, institutions, and organisations. The study uses secondary data because the subject matter has extensive documentation in institutional and regulatory sources, and because the three institutions in the sample provide substantial financial and operational information, and because banking technology advances too quickly to conduct primary data collection for this research. Research data was collected from six source categories: (a) official publications of the three institutions including integrated annual reports and quarterly financial results; (b) regulatory publications from the Reserve Bank of India including the FREE-AI framework and the Master Directions on Payment Aggregators and Digital Lending; (c) Government of India publications from the Ministry of Finance and the Press Information Bureau; (d) industry research from the National Payments Corporation of India, KPMG, and the Atlantic Council; (e) peer-reviewed academic literature sourced through Google Scholar, Social Science Research Network, ScienceDirect, and MDPI; and (f) credible financial

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journalism from Business Standard, Inc42, Medianama, TechCrunch, and Entrackr, used for 2024 to early 2026 developments not yet captured in academic literature.

Mode of Collection

The collection process began with a broad survey of existing literature on technology in Indian banking and progressed through a narrowing of focus toward the three institutions in the sample. Searches across academic databases used keyword combinations such as "YONO digital transformation," "HDFC Bank digital strategy," "Paytm Payments Bank RBI restrictions," "Unified Payments Interface growth," and "FREE-AI framework Reserve Bank of India." Each source was evaluated against four criteria, namely credibility, relevance, recency with preference given to sources from 2022 onwards, and consistency through cross-referencing against multiple independent sources. Sources that failed any of these tests were excluded from the analysis.

Analytical Approach

The analysis is thematic and comparative. Thematic analysis identified recurring patterns including digital platform development, artificial intelligence integration, customer experience, cybersecurity, financial performance, and regulatory positioning which were organised into coherent themes addressing the research objectives. The comparative dimension places the three institutions alongside one another across each theme, asking what the current state of each institution is, how it compares with the other two, and what the comparison reveals about the broader category of banking that each represents. As a qualitative, secondary-data study, no statistical techniques such as regression or formal hypothesis testing were employed; the study uses interpretive synthesis, institutional comparison, and evidence triangulation as its core analytical methods.

Analysis And Interpretation

This chapter examines each of the three institutions in turn, comparing them across six thematic dimensions identified in the methodology, and draws out the patterns of convergence and distinctiveness that together define contemporary Indian banking. The analysis draws on secondary data through early 2026, including the December 2025 YONO 2.0 launch, the November 2025 restoration of Paytm's payment aggregator licensing, and the continuing implementation of the Reserve Bank of India's FREE-AI framework.

State Bank of India: Scale-Driven Digital Transformation

The State Bank of India serves approximately five hundred million customers through a network of approximately twenty-two thousand domestic branches, and holds approximately 23% of total banking assets in the country. Its YONO digital platform which launched in November 2017 and relaunched as YONO 2.0 in December 2025 had approximately ninety-six million active users at the time of the relaunch, with a stated target of doubling to two hundred million over the medium term. Industry analysis has attributed a meaningful portion of the bank's record fiscal year 2025 profit of approximately seventy-six thousand seven hundred and fifty crore rupees to the cost-to-serve reductions and cross-selling opportunities enabled by YONO. SBI Research analysis of National Payments Corporation of India data released in August 2025 establishes that the State Bank of India is the top Unified Payments Interface remitter member with approximately five point two billion transactions per month, a volume approximately three and four-tenths times larger than that of the second-ranked remitter bank.

HDFC Bank: Phygital Integration and Artificial Intelligence Leadership

HDFC Bank stands as India's biggest private sector bank because it serves ninety-three million customers through its network of more than 8,800 branches after its July 2023 merger with HDFC Limited. The bank directs sixty-five percent of its financial operations through its mobile application while maintaining a cost-to-income ratio of forty point eight percent for the nine months ending December 2024. This is significantly lower than the State Bank of India's predicted ratio of mid-fifty-percent. HDFC Bank stands as the top Indian banking institution using artificial intelligence because it launched the EVA chatbot in 2017, supports the BharatGPT Indian large language model project, works with FICO for AI-based mortgage credit decisions, and uses artificial intelligence

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for fraud detection, credit assessment, customer support, and personalised services. The bank received the Best Retail Bank in India award at The Asian Banker International Excellence in Retail Financial Services Awards 2025.

Paytm: Crisis-Driven Reinvention and the Payments Bank Model

Paytm Payments Bank operated as one of the largest Indian payments banks until early 2024 based on its extensive customer base and high Unified Payments Interface transaction numbers. The Reserve Bank of India enforced operational constraints on Paytm Payments Bank through Section 35A of the Banking Regulation Act 1949 on January 31, 2024 because the bank failed to meet its compliance obligations and showed multiple significant regulatory issues. The action terminated the institution which functioned as a going concern. This led to two major impacts on One97 Communications through a 33% revenue drop in December 2024 and more than 800 crore rupees in total losses during 2024. The company adopted a strategic shift between 2024 and 2025 to operate as a Third-Party Application Provider through partnerships with Axis Bank, HDFC Bank, State Bank of India, and Yes Bank on the Unified Payments Interface platform, while using a Default Loss Guarantee model to distribute credit through regulated lenders. The Reserve Bank of India provided its last authorisation for payment aggregator operations in August 2025, and the company obtained its Certificate of Authorisation on November 26, 2025, before achieving profitability in the first quarter of fiscal year 2026.

Comparative Findings: Convergence Alongside Preserved Distinctiveness

The comparative analysis reveals a pattern of simultaneous convergence and preserved distinctiveness. All three institutions now offer mobile-first customer interfaces, participate in the Unified Payments Interface at substantial scale, and have integrated artificial intelligence into fraud detection, credit underwriting, and customer service. At the same time, each institution retains distinctive strengths: the State Bank of India retains its scale and its role in government banking business; HDFC Bank retains its artificial intelligence leadership and phygital customer model; Paytm retains its digital-native orientation and merchant focus. Importantly, each institution leads on different metrics: SBI leads on absolute digital scale and UPI remitter volumes; HDFC Bank leads on cost-to-income ratio and artificial intelligence maturity; Paytm leads on the proportion of transactions conducted through digital channels. The common narrative that financial technology and private sector institutions are uniformly ahead of public sector banks in digital adoption is therefore an oversimplification.

The Moderating Role of Regulation, Infrastructure, and Business Model

The relationship between technology adoption and business outcomes is moderated by three factors that emerge consistently across the three institutional cases. First, the regulatory framework determines the range of revenue-generating activities available to an institution and therefore the ultimate returns that technology investment can produce, as illustrated by the Paytm case where extensive technology adoption coexisted with substantial financial losses because the payments bank business model could not generate revenues commensurate with its compliance burden. Second, the quality of underlying technology infrastructure determines whether digital transaction volumes translate into genuine operational efficiency, as illustrated by the State Bank of India's Unified Payments Interface technical decline rate of approximately three point one two percent despite the bank's substantial digital investment. Third, the business model into which technology is embedded determines whether digital adoption produces cross-selling opportunities or lower-margin payment flows. Technology adoption is therefore a necessary but not sufficient condition for favourable business outcomes.

The Future: Convergent Infrastructure, Distinctive Propositions

Indian banking will develop through two main paths which unite a common technological base yet maintain distinct approaches to customer service, distribution methods, and market competition strategies. The Indian Digital Public Infrastructure stack which includes the Unified Payments Interface, the Aadhaar identity system, the Account Aggregator framework, and the Digital Rupee is making banking operations into common services which used to provide banks with their competitive edge, and is allowing banking technology to reach additional financial organisations and their non-bank customers. The competitive marketplace now requires organisations

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to demonstrate their technological abilities through large-scale operations which must include particular customer service approaches, distribution systems, and cost management strategies.

The institutions which will succeed during the next ten years need to unite their technological abilities with particular strategic decisions which stem from their unique organisational background, their customer relationships, and their operating environment. The Reserve Bank of India operates through two main strategies — building infrastructure while demanding strict regulatory compliance, as shown by their 2024 Paytm Payments Bank enforcement and upcoming 2025 FREE-AI framework implementation. Institutions which have established strong compliance and governance systems will gain competitive advantage over institutions which placed growth before governance.

FINDINGS AND CONCLUSION

Key Findings

The study produces five main discoveries which represent the core results of this research. First, the Indian banking sector shows distinct digital adoption patterns across multiple dimensions, with each bank excelling in different digital adoption metrics instead of following a standard ranking system that places financial technology and private sector institutions uniformly ahead of public sector banks. Second, the three institutions show positive relationships between technology adoption and their operational efficiency and customer reach, but the relationship is moderated by regulatory framework, infrastructure quality, and business model factors. Third, the implementation of technology creates visible effects which modify how institutions compete in the market and how regulatory bodies respond. Fourth, the three institutions are moving toward a single operating model using mobile-first interfaces, artificial intelligence, and the Unified Payments Interface, yet each institution maintains its own unique capabilities. Fifth, the present-day Indian banking system shows two opposing trends convergence and divergence which will affect institutional strategic decisions, regulatory frameworks, and market competition through the next ten years.

Conclusion

What comes through clearly in the evidence is that Indian banking technology is not moving toward the victory of one institutional category over the others. Public sector banks remain enormously important by the scale of their customer bases and their role in financial inclusion and government banking business. Private sector banks continue to lead on many dimensions of technology adoption and operational efficiency. Financial technology institutions continue to innovate and to reinvent themselves in response to regulatory pressure. The future is most likely to be characterised by the coexistence of all three categories, each drawing on commoditised Digital Public Infrastructure, each subject to an increasingly sophisticated regulatory framework, and each competing for customers in a market that is itself being transformed by technology.

The convergence paradox that this paper identifies in which institutions adopt increasingly similar technologies while retaining increasingly distinctive strategic positions is not a temporary feature of the current transition but appears to be the settled logic of contemporary Indian banking. Indian banking today stands at a point of unusual opportunity. The underlying digital public infrastructure is world-class; the regulatory framework is increasingly sophisticated; the competitive dynamics are producing both convergence and distinctiveness; and the customer base is expanding, digitising, and demanding more from the institutions that serve it. Whether the sector fulfils the potential of this moment will depend on the choices made by each of the three categories of institution examined in this paper and on the continued balance of innovation promotion and compliance enforcement maintained by the Reserve Bank of India.

RECOMMENDATIONS, LIMITATIONS, AND SCOPE

Recommendations

Public sector banks should accelerate digital conversion of their existing customer bases through distinctive rather than imitative strategies, following the State Bank of India model of branch-assisted conversion and

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vernacular language expansion, while investing substantially in core banking modernisation to address operational resilience concerns visible in metrics such as Unified Payments Interface technical decline rates. Private sector banks should defend their artificial intelligence advantage through continued investment in proprietary capabilities and in explainable artificial intelligence that meets emerging FREE-AI compliance requirements. Financial technology institutions should internalise the compliance lessons of the Paytm experience by investing in governance and risk management from the outset and by designing business models around partnerships with regulated banks rather than acquiring banking licences. The Reserve Bank of India should maintain its current balance between innovation promotion and enforcement, clarify the future of the payments bank model, and consider category-specific operational requirements under the FREE-AI framework. Customers should maintain banking relationships across multiple institutional types for resilience, and should invest time in developing digital banking skills and fraud vigilance.

Limitations of the Study

The research contains various restrictions which impact its findings. The research depends on existing data, which prevents it from obtaining direct feedback from customers and employees who work at the three institutions through first-hand surveys and interviews. The study restricts its ability to apply results to other settings because it uses a small non-random sample of three institutions, which were chosen as top examples from different categories. The research findings from early 2026 data collection might have been affected by the quick changes in regulatory and technological environments. The research depends on English-language sources, which probably misses out on banking technology adoption views from regional media and community-based discussions in rural India.

Scope of the Study

This study focuses on the Indian context and covers developments from approximately 2017 through early 2026, encompassing the launch of YONO and the Unified Payments Interface, the HDFC Limited and HDFC Bank merger, the Reserve Bank of India restrictions on Paytm Payments Bank, the FREE-AI framework, and the YONO 2.0 launch. The analysis covers six thematic dimensions, namely digital platform development, artificial intelligence integration, customer experience, cybersecurity, financial performance, and regulatory positioning. Future research should extend the sample to include additional public sector banks such as Bank of Baroda and Punjab National Bank, additional private sector banks including ICICI Bank and Axis Bank, and additional financial technology institutions including PhonePe and Razorpay. Primary data collection through customer surveys, employee interviews, or ethnographic observation of branch-based digital conversion programmes would substantially extend the depth of understanding available through secondary-data analysis alone.

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